

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 40.

May, 1938.

No. 473.

VALERIANELLA IN NORTH AMERICA¹

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(Plates 492-494)

A recent attempt by the writer to reidentify the material of this perplexing genus in the Cornell Herbarium has seemed to show that other forms exist in North America than those ordinarily recognized. A detailed study of the material in this and other herbaria has resulted in the present paper.

It has long been recognized that the most important diagnostic characters between the species in this genus are furnished by the fruit. Indeed the foliage, and in some cases the flowers also, are so nearly alike in the various species that only a specialist can hope to distinguish them by this means alone. A reexamination of the various possible characters with regard to their taxonomic worth constituted the first step in the present study.

The fruits were found to vary in size from 1.5 to 4 mm. in length and to be composed of three cells, the dorsal one fertile with a vertical outline ranging from narrowly elliptic to broadly ovate; the two ventral ones sterile, appearing as two almost parallel tubes, or in other cases these widely divergent and inflated. The groove formed between these sterile cells, the relative size and shape of these as compared with the fertile cell, and the shape of the fertile cell itself are perhaps the most important fruit characters. In one group of species including *V. amarella*, *V. ozarkana*, and *V. texana*, the kind, size and arrangement of the hairs on the fruit was also found to be important.

¹ The cost of plates and extra pages met by the author.—EDS.

Next to the fruits, the flowers are of importance. The species having salver-form corollas and those with funnel-form corollas have long been recognized as forming two distinct sections called *Siphonella* and *Valerianella* proper, respectively. Within the *Siphonella* section the length of the corolla tube and the location of the callous gibbosity on it have been cited as separating some of the species, but no special attention has been given the group with funnel-form corolla other than to note a variation in color. A critical study of this section, however, shows that the species can be divided into two groups, one with the corollas short and extending only slightly above the bracts in the inflorescence and another with corollas larger extending distinctly above the bracts and hence very conspicuous.

A third character of some importance tending to support the separation of the genus into two sections as based on the corolla is that found in the bracts. In the *Siphonella* section these are strongly glandularly fimbriate-serrulate while in the true *Valerianellas* they are either entire and glabrous, or ciliate on the margins, or, only occasionally and slightly, glandularly fimbriate-serrulate. The rounded, pointed, or acuminate tip of the bracts also is important as separating certain species, but without reference to sectional lines.

The pubescence of the plant may be of diagnostic value in certain cases as for instance in separating *V. chenopodifolia* and *V. amarella* from the other species.

The stature of the plant as well as the size and shape of the leaves, though highly variable, are of little taxonomic importance. The variations seem to be chiefly ecological and individual and are largely matters of degree. In general the foliage is remarkably similar in the various species.

The soil requirements of the *Valerianellas* have not been thoroughly studied. Field and greenhouse study tend to indicate, however, that certain species, as *V. amarella*, *V. Bushii*, *V. ozarkana*, *V. chenopodifolia* and *V. intermedia*, are definitely calciphile. The first three of these species were collected only in habitats where limestone was abundant. The other two have not been collected by the writer but the habitats given on the labels indicate that they are also from calcareous districts. All of these species when grown under greenhouse conditions without any increase in the calcium content of the soil showed a marked abnormality in growth. Other species, as *V. longiflora*, *V. Nuttallii*, *V. radiata* and its varieties, *V. stenocarpa* var.

parviflora, and *V. Woodsiana*, known to grow in non-calcareous districts, gave normal growth under the same greenhouse conditions. All of the various species seem to grow more abundantly in moist habitats. They may inhabit forests, thickety brook banks, or even occur in open fields or along roadsides and on barrens. If *V. radiata* and *V. olitoria* (an introduced species) are excepted, the remaining species fall into two geographic groups, separated by the Mississippi River.

The genus seems to have been first recognized as distinct from *Valeriana* by Tournefort¹ in 1742, who gave it the name *Valerianella*. The first to recognize *Valerianella* in post-Linnean times was apparently Miller² in 1754. The name *Fedia* was first proposed by Gaertner³ in 1791 to displace *Valerianella*. In 1830 DeCandolle⁴ segregated the group into three genera, *Fedia* proper, *Valerianella* and *Plectritis*. Woods⁵ in 1837 proposed a union of *Fedia* with *Valerianella* but under the name *Fedia*, his objection to the name *Valerianella* being that it is a diminutive in form. Torrey and Gray⁶ in 1841, perhaps following Woods in this respect, treated *Fedia* and *Valerianella* together under *Fedia* but recognized *Plectritis* as distinct. This procedure was followed in the first five editions of Gray's Manual and in Wood's botanies. Gray⁷ in 1883, and again in the Synoptical Flora in 1884, united all three genera but under the name *Valerianella* as the oldest name and the one connected with the largest number of species. Höck⁸ in 1891 again treated the three genera as distinct but transferred the section *Siphonella* of *Valerianella* to *Plectritis*. Since that time American authors have variously treated the two groups occurring in this country, *Valerianella* and *Plectritis*, as one genus or as two. While, as Dr. Gray states, most of the distinguishing characters cited by various writers break down, yet the group *Plectritis* seems to be a reasonable entity, as good as *Fedia* if not better. Following the practice of several more recent authors the writer is treating the two genera as distinct.

The first really critical study of the North American species of

¹ Tourn. ex Hall. Enum. Stirp. Helv. 666 (1742).

² Miller, Gard. Dict. Abr. Ed. 4 (1754).

³ Gaertner, Fruct. et Sem. 2: 36, t. 86, f. 3 (1791) partim.

⁴ DeCandolle, Prod. 4: 629 ff. (1830).

⁵ Woods, Trans. Linn. Soc. 17: pt. 3, 421-433 (1837).

⁶ T. & G., Fl. N. Am. 2: 50-53 (1841).

⁷ Gray, Proc. Amer. Acad. 19: 81-83 (1883).

⁸ Höck, Engler & Prantl, Nat. Pflanzenfamilien 4¹: 172-178 (1897).

Valerianella was that of Torrey and Gray,¹ who in 1841, described four new species and a new variety.

In 1864, Krok,² a Swedish botanist, published a very critical monograph of the *Valerianellas* of the world. Included were four plates of drawings of the fruits of all of the species known at that time.

In 1872, appeared a paper by Thos. C. Porter,³ on "The *Fedias* of the Northern United States." In this the illustrations of the fruits were especially valuable. No new species were proposed but *Fedia patchlaria* and *Fedia umbilicata* were reduced to varietal rank under *F. radiata*.

The last comprehensive revision of the genus in North America was by Dr. Gray⁴ in 1883, repeated in the Synoptical Flora in 1884.

The general practice of the European students of *Valerianella* in subdividing the genus into sections should be considered briefly. Krok gave a good summary of the different subdivisions recognized by the earlier botanists, giving also his own, which is composed of older sections that he believed suitable and some new ones which he proposed. His treatment included all of the recognized North American species and is therefore important here. However, the discovery noted in the present paper of two new species in the long-flowered section *Siphonella* is disconcerting since suborbicular fruit is one of the important characters of this section and both of these new species have oblong fruits. Neither does the character of glandularly fimbriate-serrulate bracts hold as a distinguishing mark of this section as stated by Krok. This character is very prominent in the *Siphonella* section but it also occurs to a much less degree in *V. stenocarpa*, *V. radiata* and *V. Woodsiana* which are in the *Platycoelae* section of Krok. Also in one of the young plants of *V. Bushii*, which belongs to the group with prominent glandularly fimbriate-serrulate bracts, most of the bracts are ciliate. The only character left to separate *Siphonella* and *Platycoelae* is the type of corolla. Therefore Small's practice of considering *Siphonella* a genus seems scarcely warranted.

As a result of the present critical examination of literature and specimens, five new species and three new varieties have been recognized by the writer. It is hoped that the key here submitted will make identification less difficult than before. A considerable magni-

¹ Torrey & Gray, Fl. N. Am. 2: 50-53 (1841).

² Krok, Kongl. Svensk. Akad. Handl. 5: 1-105, 4 pl. (1864).

³ Porter, Am. Naturalist 6: 385-388 (1872).

⁴ Gray, Proc. Am. Acad. 19: 81-83 (1883).

fication has been found helpful, however, in working out the fruit characters.

The material forming the basis of this study is that in the herbarium of Cornell University, the Bailey Hortorium, the Gray Herbarium, the New York Botanical Garden, the Missouri Botanical Garden, the University of Arkansas, the University of Oklahoma and type specimens in the European herbaria. Altogether about 1,000 specimens have been examined.

The need for a revision of the genus *Valerianella* in North America was suggested to the writer by Dr. K. M. Wiegand of Cornell University, under whose supervision the work has been carried on and completed. To him the writer wishes to express appreciation for his encouragement, helpful suggestions and advice and to the curators of various herbaria for the loan of specimens which made the completion of the problem possible. The writer is also indebted to Dr. L. H. Bailey, whose assistance made the study of types in foreign herbaria a pleasure, and to Miss Velma Knox of Cornell University for the drawings.

- A. Corolla funnel-form, or more open, usually with a short proper tube equalling the limb or shorter, the throat with a small saccate gibbosity at its base on the ventral side.
- B. Fruits with a corky mass on the dorsal side of the fertile cell.....1. *V. olitoria*
- B. Fruits without the corky mass.
- C. Fertile cell of fruit about one-third to one-half the combined width of the sterile cells.
- D. Corolla 1.5–2 mm. long, inconspicuous above the bracts; fertile cell of fruit ellipsoid.....2. *V. Woodsiana*
- D. Corolla 3–5 mm. long, conspicuous above the bracts; fertile cell of fruit ovate.
- E. Fruit 3.25 mm. long by 3 mm. wide, flattened dorsiventrally.....3. *V. patellaria*
- E. Fruit 2–2.5 mm. long by 2 mm. wide, globular with a pit-like depression on the ventral surface between the sterile cells.....4. *V. umbilicata*
- C. Fertile cell of fruit about equalling or wider than the combined width of the sterile cells.
- F. Plants glabrous except for tufts of hairs on each side of the leaf-base near the nodes.
- G. Fruit glabrous or finely pubescent, 3–4 mm. long; corymb loose, glomerate cymules few.....5. *V. chenopodifolia*
- G. Fruit white-hirsute, 1.5–2 mm. long, hairs uncinata; corymb compact, glomerate cymules many.....6. *V. amarella*
- F. Plants pubescent, sometimes only on the leaves and on the lower part of the stem, in addition to tufts on each side of leaf-base near the nodes.
- H. Fruits laterally compressed, strongly carinate.
- I. Corolla completely white, 2 mm. long, conspicuous above the bracts; hairs on the fruit capitate, arranged in lines on the fertile and sterile cells...7. *V. texana*

- I. Corolla white with purplish-blue lobes, 1.5 mm. long, inconspicuous above the bracts; hairs on fruit, when present, pointed, not arranged in lines.....8. *V. carinata*
- H. Fruits dorsiventrally compressed, never strongly carinate.
- J. Fruits ellipsoid; fertile cell rounded on the dorsal side.
- K. Corolla 2.5–3.5 mm. long, conspicuous above the bracts.....9. *V. stenocarpa*
- K. Corolla 1.5 mm. long, inconspicuous above the bracts.....10. *V. stenocarpa*, var. *parviflora*
- J. Fruits ovoid; fertile cell flattened on the dorsal side.
- L. Corolla 3–5 mm. long, conspicuous above the bracts.
- M. Fruits slightly more than twice as long as wide, sterile cells abortive.....11. *V. Palmeri*
- M. Fruits less than twice as long as wide, sterile cells about as thick as the fertile.....12. *V. intermedia*
- L. Corolla 1.5–2 mm. long, inconspicuous above the bracts
- N. Sterile cells of fruit more or less divergent with a prominent groove between them, their combined width slightly less than or wider than the fertile
- O. Fertile cell equalling or wider than the combined width of the sterile cells.....13. *V. radiata*
- O. Fertile cell slightly less than the combined width of the sterile cells
- 14. *V. radiata*, var. *missouriensis*
- N. Sterile cells more approximate with only a slight groove between them, their combined width about half the width of the fertile.....15. *V. radiata*, var. *Fernaldii*
- A. Corolla salver-form, the tube double or quadruple the length of the limb, with a small callous gibbosity on the ventral side.
- P. Corolla-tube 4–5 mm. long with the gibbosity near or above the middle.....16. *V. Nuttallii*
- P. Corolla-tube 7–9 mm. long with the gibbosity near the base.
- Q. Fruit laterally compressed with three distinct lines of long hairs, one down the dorsal side of the fertile cell and one down each of the sterile cells.....17. *V. ozarkana*
- Q. Fruits flattened dorsiventrally, glabrous or finely pubescent without any distinct lines.
- R. Fruit oblong, fertile cell larger than the sterile cells, groove between the latter narrow.....18. *V. Bushii*
- R. Fruit nearly orbicular in ventral view; fertile cell much narrower than the sterile cells, groove between the latter wide.....19. *V. longiflora*

1. VALERIANELLA OLITORIA (L.) Dufr. *Valeriana Locusta* α *olitoria* Linn., Sp. Pl. 33 (1753). *Valerianella olitoria* Poll., Hist. Pl. Palat. 1: 30 (1776); Krok, Kongl. Svensk. Akad. Handl. 5: 88 (1864); Dudley, The Cayuga Flora, Bull. Cornell Univ. 2, pt. 1: 45; Gray, Syn. Fl. N. Am. 1, pt. 2: 44; Chapman, Fl. S. U. S. ed. 3: 202. *Valerianella Locusta* Betsche, Anim. Val. 10 (1826); Robinson & Fernald, Gray's

Man. ed. 7, 762; Britton & Brown, Ill. Fl. 3: 245 & ed. 2, 3: 286; Small, Fl. Se. U. S., ed. 1 & 2, 1128; House, Ferns and Flowering Plants of New York State, 656; Wiegand & Eames, Fl. of Cayuga Lake Basin, 391; Small, Man. Se. Fl., 1278; Muenscher, Weeds, 438. *Fedia olitoria* Vahl, Enum, 1: 19 (1804); T. & G. Fl. N. Am. 2: 51.—Stem 1–2.5 dm. high, pubescent: leaves hairy on the margin, upper surface, and along the midrib on the lower surface; the lower spatulate, connate, entire; the upper oblong-ovate, sessile with a few teeth on each side near the base: bracts ciliate; the inner narrow and blunt; the outer broad and rounded at apex: inflorescence loose, open, and corymbosely cymose: corolla white, often with bluish limbs, funnel-form, 1.5 mm. long; throat extending almost to the base; tube very short with a saccate gibbosity at the base of the throat on the ventral side: stamens and style not much exerted: stigma-lobes short: fruit yellowish, 2–4 mm. long (usually 2 mm.), laterally compressed, glabrous or finely pubescent, with a thick corky mass on the dorsal side of the fertile cell; sterile cells narrow with a very narrow shallow groove between them; cross section of fruit elliptic.—Moist waste places, eastern United States, Utah, Idaho, Oregon, and California. Introduced from Europe. Among 75 specimens examined were the following: NEW YORK: Frontenac Island, Cayuga Lake, June 7, 1884, *Dudley*, no 70; pasture south side of hill road north of Coy Glen, Ithaca, May 18, 1919, *A. H. Wright*, no. 12956. NEW JERSEY: bank of canal feeder, Trenton, *R. C. Perry*. PENNSYLVANIA: along west bank of Tacoma Creek, Crescentville, Philadelphia, May 9, 1899, *MacElwee*; Conestoga Creek, *A. F. Eby*; damp grassy bank of Beaver Creek, $1\frac{1}{4}$ miles northeast of Ottville, June 4, 1933, *F. J. Hermann*, no. 4284; border of moist woods near Schuylkill River, Linfield, May 1, 1915, *Long*, no. 11662; Lancaster, May 18, 1861, *C. F. Parker*, no. 2864; Park, Robinson's Knoll, Philadelphia, May 24, 1872, *Redfield*, no. 2863. DISTRICT OF COLUMBIA: Avalon Heights, May 15, 1892, *Ferdinand Blanchard*; brushy alluvial flat, above Cabin John, May 7, 1906, *Maxon*, no. 6151. VIRGINIA: grassy roadside in town, Williamsburg, *Grimes*, no. 3451; dry bank, Hunting Creek, May 3, 1905, *Painter*, no. 1242. NORTH CAROLINA: Chapel Hill, April 1891, *F. B. Maxwell*. INDIANA: Clifty, Hanover, May 19, 1893. TENNESSEE: water tank on K. & C. R. R., Knoxville, May 9, 1899, *Ruth*, no. 80; waste grounds, Knox Co., June 1898, *Ruth*, no. 612. IDAHO: collected about Lewiston, May 18, 1896, *A. A. & E. Gertrude Heller*, no. 3085; grassy meadows, Valley of Clearwater River, Lewiston, May 13, 1892, *Sandberg*, no. 157. OREGON: Imnaho, Wallowa Co., June 5, 1923, *Wm. Sherwood*, no. 457. CALIFORNIA: Siskiyou Co., *Geo. D. Butler*, no. 729.

The writer examined the type of this species in the Linnean Herbarium, which is labeled, "*Locusta olitoria*" in Linnaeus' own handwriting. Most of the manuals and floras in the United States recognize the name *V. Locusta* for this species while the majority in

Europe recognize *V. olitoria*. Since there is no type in the Linnean Herbarium for *Locusta* it may be supposed that Linnaeus used that name as a binding word for his varieties. And so, following that assumption and the practice of those in charge at Kew Gardens and at the Linnean Herbarium, the alpha variety when raised to specific rank would become *V. olitoria*.

V. olitoria differs from all other North American species of *Valerianella* in its peculiar fruit with a corky mass on the dorsal side of the fertile cell. The only other species which approaches it in this respect is *V. ozarkana* which has a keel-like projection on the dorsal side of the fertile cell that seems to be a corky mass. However, the cells forming this projection are smaller than those of the corky mass in *V. olitoria*. There are three European species having a similar corky mass, *V. capitata*, *V. costata*, and *V. gibbosa*. These are all closely related to *V. olitoria*.

2. *V. WOODSIANA* (T. & G.) Walp. *Fedia Woodsiana* T. & G., Fl. N. Am. 2: 52 (1841). *V. Woodsiana* Walp., Rep. 2: 527 (1843); Gray, Syn. Fl. N. Am. 1, pt. 2: 45; J. M. Coulter, Fl. W. Texas, 348; Britton & Brown, Ill. Fl. 3: 247 & ed. 2, 3: 288; Robinson & Fernald, Gray's Man. ed. 7, 763; Small, Fl. Se. U. S. ed. 1 & 2, 1129.—Stem 1.5–5 dm. high, rather stout, pubescent along the angles: leaves hairy on the margin and on the midrib on the lower surface; the lower spatulate, entire, slightly connate; the upper oblong-ovate with several coarse teeth near the base, not connate: bracts glabrous, usually weakly glandularly fimbriate-serrulate toward the tip: inflorescence loose to more compact, corymbosely cymose: corolla white, 1.5 mm. long, funnel-form; tube much shorter than the limb; a saccate gibbosity at base of throat on the ventral side; stamens and style exserted: stigma-lobes short: fruit yellowish, sub-globose, glabrous or finely pubescent; fertile cell often short-beaked, narrowly oblong, weakly one-nerved and flattened on the dorsal side, much narrower than the inflated widely divergent sterile cells which have a wide groove between them.—Moist low grounds in woods and on the prairies of eastern Oklahoma and Texas. OKLAHOMA: near Tecumseh, June 1, 1932, *Elizabeth D. Barkley*, no. 108; sandy river bottom, 35 miles south of Norman, April 17, 1927, *R. E. Chase*, no. 37; hillsides west of Bristow, May 18, 1930, *Ora M. Clark*, no. 2582; low moist soil and dry uplands, near Norman, April 23, 1917, *R. E. Jeffs*, no. 67; one-fourth mile south of Norman, along small stream in shade, May 3, 1926, *Elbert L. Little*, no. 96; Muskogee Co., Sec. 22, T. 14 N., R. 18 E., April 23, 1927, *Little*, no. 1763; low ground southeast of Norman, *Mabel Nielsen*, no. 43; R. R. Track east of university, in moist soil, April 29, 1924, *J. A. Rieger*, no. 63. TEXAS: "common on prairies," Columbia, April 9, 1899, *Bush*, no. 85 and April 24, 1900,

no. 144; "common in woods," Columbia, April 3, 1902, *Bush*, no. 1301; near Marshall, April 20, 1901, *Canby*, no. 140; prairies, Bryan, Brazos Co., April 30, 1917, *E. J. Palmer*, no. 11726; "common in woods," Dallas, April 18, 1901, *Reverchon*, no. 2605; on barren sterile land, Tarrant Co., May 1, 1921, *Ruth*, no. 52 (in part); Rio Brassos, January, 1835, *Drummond*, no. 70 (?) (probably specimen cited in original description).

This species was based by Torrey and Gray on material collected in Texas by Berlandier and Drummond. The writer has not seen the Berlandier specimen but in the Gray Herbarium is a specimen bearing the inscription "Rio Brassos, Texas, *T. Drummond*" and named *V. Woodsiana* by Gray. This is doubtless to be considered type material.

The range of *V. Woodsiana* as here stated is eastern Oklahoma and Texas, the type coming from Texas. Most of the recent manuals give the range as from New York to Texas but in these treatments *V. patellaria* and *V. umbilicata* are regarded as varieties of *V. Woodsiana*.

V. Woodsiana closely resembles *V. radiata* in general aspect but the fertile cell of the fruit is narrowly oblong as opposed to the relatively broad ovate one of the latter species, and the fruits are generally glabrous instead of pubescent as in most specimens of *V. radiata*.

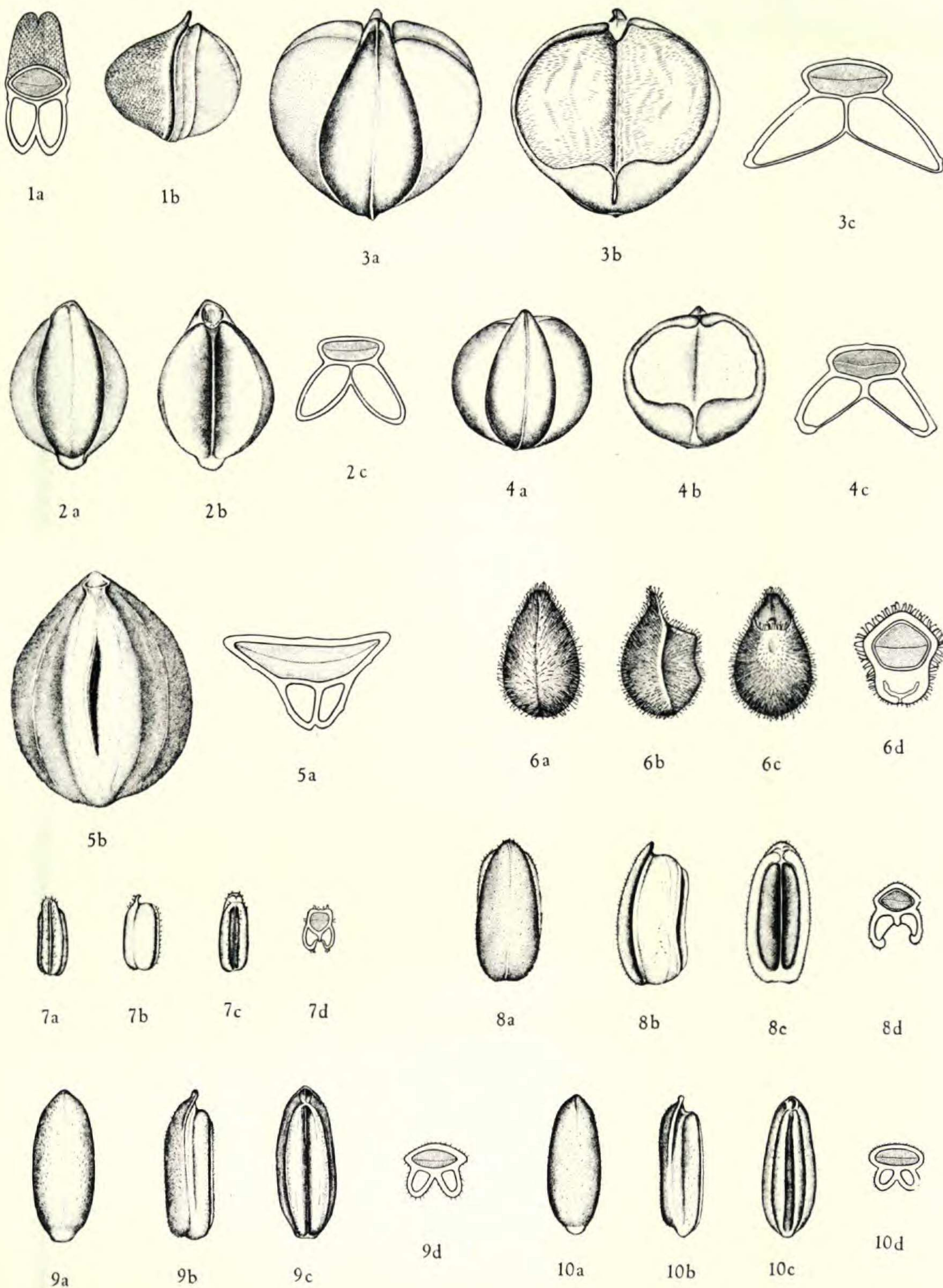
3. *V. PATELLARIA* (Sulliv.) Wood. *Fedia patellaria* Sulliv., A. Gray, Man. 183 (1848). *V. patellaria* Wood, Class Book, 405 (1861); Krok, Kongl. Svensk. Akad. Handl. 5: 67 (1864); Small, Fl. Se. U. S. ed. 1 & 2, 1129; Small, Man. Se. Fl. 1728. *V. radiata*, var. *patellaria* Porter, Am. Nat. 6: 386 (1872). *V. Woodsiana*, var. *patellaria* A. Gray, Proc. Am. Acad. 19: 82 (1883); Gray, Syn. Fl. N. Am. 1, pt. 2: 45; Britton & Brown, Ill. Fl. 3: 247 & ed. 2, 3: 288; Robinson & Fernald, Gray's Man, ed. 7, 763.—Stems 3–6 dm. high, pubescent on the angles, rather stout: leaves sparingly hairy along the margin and on the midrib on the lower surface; the lower spatulate, connate, entire; the upper oblong-ovate with a few coarse teeth near the base, not connate: bracts usually glabrous, lanceolate, the midrib slightly excurrent: inflorescence loose, corymbosely cymose: corolla white or pinkish, funnel-form, 3–5 mm. long; tube slender, as long as the limb; throat rather wide with a saccate gibbosity at its base on the ventral side: stamens and style exserted: stigma-lobes relatively long: fruit yellowish, almost orbicular as viewed from the ventral side, 3–3.5 mm. long, glabrous or finely pubescent; fertile cell ovoid, much narrower than the widely divergent sterile cells and protruding beyond them in a tooth at the apex; sterile cells extending wing-like about the fertile cell with a notch at each end; all cells nerved; cross section of fruit crescent-shaped.—Low moist grounds from New Jersey and Pennsylvania westward to Illinois, and south-

ward to Virginia, North Carolina and Tennessee. NEW JERSEY: low ground near Redbank, Gloucester Co., May 13, 1871, *C. F. Parker*. PENNSYLVANIA: Columbia, Lancaster Co., June, 1871, *Knipe and Porter*; meadow near Sellersville, June 7, 1893, *Porter*. VIRGINIA: open wet roadside near Natural Bridge, May 19, 1911, *C. F. Batchelder*; rich low meadow along the Potomac near Black Pond above Great Falls, May 24, 1925, *N. Hotchkiss*, no. 1942. NORTH CAROLINA: Swain Co., May 26, 1897, *Biltmore Herbarium*, no. 4755 (in part). OHIO: Granville, May 10, 1890, *H. L. Jones*; Columbus, *Sullivant* (probably type). ILLINOIS: Forest of Arden, Ottawa, May 30, 1905, *H. C. Skeels*, no. 613 (in part). TENNESSEE: near Nashville, 1880, *G. W. Hubbard*, no. 1149.

In the Gray Herbarium and in the herbarium of the New York Botanical Garden are specimens labeled "*Fedia patellaria*, Columbus, Ohio, *Sullivant*" and named *V. Woodsiana* var. *patellaria* by Gray. These are doubtless to be considered type material.

In 1872, T. C. Porter reduced *V. patellaria* to varietal rank under *V. radiata*, contending that by the lateral extension of the sterile cells in the fruits of *V. radiata* those of *V. patellaria* might be formed. Later, in 1883, A. Gray placed *V. patellaria* as a variety under *V. Woodsiana* without giving any reasons for the change. It has continued as a variety under that species through all of the manuals and floras with the exception of those of J. K. Small, where it is given specific rank. The present study would seem to indicate that it is specifically distinct. Besides the great difference in the fruits, the corolla of *V. patellaria* is from 3–5 mm. long as opposed to 1.5–2 mm. in both of the other species. Also there is a difference in range. *V. patellaria* is an Alleghenian species whereas *V. Woodsiana* is restricted to eastern Oklahoma and Texas.

4. *V. UMBILICATA* (Sulliv.) Wood. *Fedia umbilicata* Sulliv., Am. Jour. Sci. **42**: 50 (1842). *V. umbilicata* Wood, Class Book, 405 (1861); Krok, Svensk. Akad. Handl. **5**: 67 (1864); Small, Fl. Se. U. S. ed. 1 & 2, 1129; Small, Man. Se. Fl., 1278. *V. radiata*, var. *umbilicata* Porter, Am. Nat. **6**: 387 (1872). *V. Woodsiana*, var. *umbilicata* A. Gray, Proc. Am. Acad. **19**: 82 (1883); A. Gray, Syn. Fl. N. Am. **1**, pt 2: 45; Robinson & Fernald, Gray's Man. ed. 7, 763; Britton & Brown, Ill. Fl. **3**: 247 & ed. 2, **3**: 288.—Stem 3–6 dm. high, nearly glabrous: leaves glabrous or weakly ciliate; the lower usually ciliate, spatulate, slightly connate, entire; the upper usually glabrous, ovate with coarse teeth near the base: bracts glabrous, lanceolate, sometimes very weakly glandularly fimbriate-serrulate toward the tip: inflorescence loose, corymbosely cymose: corolla white or pink, funnel-form, 3–5 mm. long; tube slender, about the length of the limb; throat rather wide

FRUITS OF VALERIANELLA, $\times 12$

V. OLITORIA: FIG. 1a, cross section; 1b, lateral view. *V. WOODSIANA*: FIG. 2a, dorsal view; 2b, ventral view; 2c, cross section. *V. PATELLARIA*: FIG. 3a, dorsal view; 3b, ventral view; 3c, cross section. *V. UMBILICATA*: FIG. 4a, dorsal view; 4b, ventral view; 4c, cross section. *V. CHENOPODIFOLIA*: FIG. 5a, cross section; 5b, dorsal view. *V. AMARELLA*: FIG. 6a, dorsal view; 6b, lateral view; 6c, ventral view; 6d, cross section. *V. TEXANA*: FIG. 7a, dorsal view; 7b, lateral view; 7c, ventral view; 7d, cross section. *V. CARINATA*: FIG. 8a, dorsal view; 8b, lateral view; 8c, ventral view; 8d, cross section. *V. STENOCARPA*: FIG. 9a, dorsal view; 9b, lateral view; 9c, ventral view; 9d, cross section. *V. STENOCARPA*, var. *PARVIFLORA*: FIG. 10a, dorsal view; 10b, lateral view; 10c, ventral view; 10d, cross section.

with a saccate gibbosity at its base on the ventral side: stamens and style exserted: stigma-lobes short: fruit yellowish, 2–2.5 mm. long, globular-ovoid, glabrous; inflated sterile cells wider and thicker than the flattish ovoid fertile cell; margin of sterile cells ventrally incurved forming a deep umbilicus; fruit cup-shaped as viewed from the ventral surface; all cells one-nerved.—Low moist ground from New York westward to Illinois and Tennessee. NEW YORK: Yonkers, *E. C. Howe*; New Baltimore, Greene Co., 1870, *Howe*. OHIO: Columbus, *Sullivant* (probably type). ILLINOIS: Ottawa, *J. W. Huett*. TENNESSEE: Nashville, 1880, *Martindale*.

A specimen in the Gray Herbarium collected by Sullivant labeled, "*Fedia umbilicata*, Sullivant, in Sill. Jour." is doubtless type material.

In 1872, T. C. Porter also reduced this species to varietal rank under *V. radiata*, assuming that the fruits of this species might be formed not by the lateral extension of the sterile cells as he contends the fruit of *V. patellaria* might have arisen, but by the expansion of the sterile cells where the partition between them is lacking. Gray, in 1883, recognized it as a variety under *V. Woodsiana* but gives no reasons why he considers it as such. Like *V. patellaria*, it has continued as a variety under *V. Woodsiana* through all of the manuals and floras with the exception of those of J. K. Small where it is given specific rank. The present study would seem to indicate that it is also specifically distinct. The fruits of this species are more globular with a pit-like depression between the sterile cells instead of a groove and the corollas are two or more times the size of those of *V. radiata* and *V. Woodsiana*.

V. umbilicata is most closely related to *V. patellaria* from which it differs in having a smaller globular fruit with a pit-like depression between the sterile cells as opposed to the large, dorsiventrally compressed fruits of the latter which have a wide groove between the sterile cells.

5. *V. CHENOPODIFOLIA* (Pursh) DC. *Fedia chenopodifolia* Pursh, Fl. Am. Sept. 2: 727 (suppl.) (1814). *V. chenopodifolia* DC., Prod. 4: 627 (1830); A. Gray, Syn. Fl. N. Am. 1, pt 2: 45; Britton & Brown, Ill. Fl. 3: 246 and ed. 2, 3: 287; Robinson & Fernald, Gray's Man. ed. 7, 762; Rydberg, Fl. Prairies and Plains Cent. N. Am. 760. *Fedia triquetra* Hochst. & Steud. in exs. Un. itin. (1837); Krok, Svensk. Kongl. Akad. Handl. 5: 54 (1864). *Fedia Fagopyrum* T. & G., Fl. N. Am. 2: 51 (1841).—Stem 1.5–6 dm. high, glabrous: leaves glabrous except for tufts of hairs on each side of the base near the nodes; the lower ovate-spatulate, entire; the upper narrowly lanceolate, sessile with a few teeth near the base: bracts glabrous, broadly lanceolate:

inflorescence loose, corymbosely cymose; glomerate cymules few: corolla white, 3–4 mm. long, funnel-form with a saccate gibbosity at the base of the throat on the ventral side; tube slender, about as long as the limb: stamens and style exserted: stigma-lobes short: fruit yellowish brown, 3–4 mm. long, glabrous or finely pubescent; fertile cell ovoid, broad, dorsally flattened, much wider than the combined width of the sterile cells; groove between the sterile cells narrow and shallow; cross section of fruit triangular with the ventral angle rounded and grooved.—Shady moist places from Ontario, New York, and Pennsylvania, westward to Ohio and Indiana. ONTARIO: Point Abino, *W. Johnson*. NEW YORK: gulf road 1 mile north of Le Roy, May 23, 1921, *M. S. Baxter*, no. 5568; poor limy flat field, Le Roy, May 22, 1921, *Wiegand*, no. 14057; Utica, 1832, *Gray*. PENNSYLVANIA: Huntington, *Kelly*; Allegheny Co., May 19, 1871, *Knipe and Porter*. OHIO: shady places on the Miami, 1833, *Frank*, no. 671; Columbus, *Sullivant*. INDIANA: Studebaker's woods, South Bend, *Nieuwland*, no. 10110.

Fedia chenopodifolia was founded on a specimen in the Sherard Herbarium, now at Oxford. Pursh's description is brief and not distinctive as characters are now used. An examination of the type by Gray in 1883 revealed it to belong to the present species and to be the same as Hochstetter and Steudel's *F. triquetra* and the *F. Fagopyrum* of Torrey and Gray. The writer has also examined the type and would confirm Gray's identification. It may be mentioned, however, that Pursh cited it "In Virginia. ☉. v. s. in *Herb. Sherard*." No specimens have been seen by the writer from south of Pennsylvania.

This species is peculiar in having large buckwheat-like fruit and does not seem closely related to any other *Valerianella* known to the writer.

6. V. AMARELLA (Lindh.) Krok. *Fedia amarella* Lindh. Mss., Gray, Plant. Lindh. pt. 2, in Boston Jour. Nat. Hist. 4: 217 (1857). *V. amarella* Krok, Svensk. Kongl. Akad. Handl. 5: 55 (1864); A. Gray, Syn. Fl. N. Am. 1, pt 2: 45; Coulter, Fl. W. Texas, 163; Small, Fl. Se. U. S. ed. 1 and 2, 1129.—Stem 1.5–3 dm. high, glabrous: leaves glabrous except for tufts of hairs on each side of the base near the nodes; the lower obovate-spatulate, entire; the upper oblong-obovate, sessile: bracts glabrous, ovate-lanceolate, rounded or acute at the apex: inflorescence compact, corymbosely cymose: corolla white, funnel-form, 1.5–3 mm. long; limb usually as long as the throat and tube combined; a saccate gibbosity at the base of the throat on the ventral side: stamens and style usually long-exserted, sometimes either stamens or style short and abortive: stigma-lobes short: fruit 1.5–2 mm. long, subglobose, ovoid, brownish, hirsute with rather long uncinatate white hairs; sterile cells much smaller than the

large fertile cell, contiguous, groove between them narrow and very shallow or inconspicuous.—Rocky calcareous open hills or low grounds and barrens; eastern Kansas, Oklahoma, and Texas. Previously known only from Texas. KANSAS: Paola, Miami Co., June 11, 1884, *Oyster*. OKLAHOMA: meadow north of Blanchard, May 11, 1924, *Olive S. Davidson*, no. 15; Arbuckle Mts., April 22, 1927, *Lois Gould*; low damp grounds, 1 mile northeast of Norman, April 1926, *Jeffs*, no. 22 and no. 30; low grounds, Campus, April 28, 1924, *Rieger*, no. 48; rich sandy soil by stream, near R. R. south of Dougherty, Murray Co., May 1, 1926, *Robert Stratton*, no. 65 (in part); on Little River, Cleveland Co., June 15, 1903, *A. H. Van Vleet*, no. 506. TEXAS: "common on prairies," Dallas, April 13, 1900, *Bush*, no. 574; Leon Springs, Bexar Co., "Tropical life Zone," May 29, 1911, *Mr. & Mrs. J. Clemens*, no. 495; 8 miles south of Bulverde, Bexar Co., May 2, 1933, *Cory*, no. 6085; roadside and field in barren rocky soil about 35 miles south of Dallas, Ellis Co., May 19, 1936, *Sarah C. Dyal*, *Elizabeth Fisher & Helen Hazard*, no. 214; roadside and field north of Temple, Bell Co., May 20, 1936, *Dyal*, *Fisher & Hazard*, no. 217; dry bed of Barton Creek, Austin, Travis Co., May 21, 1936, *Dyal*, *Fisher & Hazard*, no. 216; dry bed of Bull Creek west of Austin, Travis Co., May 21, 1936, *Dyal*, *Fisher & Hazard*, no. 215; dry hills, Austin, *Elihu Hall*, no. 295; Belkenys, *Sutton Hayes*, no. 338; Kerrville, April 19–25, 1894, *Heller*, no. 1623; Comanche Springs, New Braunfels, etc., May, 1849, *Lindheimer*, no. 850 and no. 851 (type collection); Sonora, April 14, 1930, *Marcus E. Jones*, no. 2608; Camp Bullis, north of San Antonio, April 12, 1931, *Susan D. MacKelvey*, no. 1812; vicinity of Colorado City, May 28, 1883, *Oyster*; rocky open ground, Boerne, Kendall Co., May 19, 1916, *E. J. Palmer*, no. 9828; rocky open grounds, Boerne, April 21, 1917, *Palmer*, no. 11620; open calcareous ground, Cedar Park, Williamson Co., April 18, 1828, *Palmer*, no. 1349; light soil, Dallas, May–June, *Reverchon*; dry uplands, Dallas, April–May, 1881, *Reverchon*, no. 400; "common," Tarrant Co., May 2, 1912, *Ruth*, no. 52.

This species was based by Gray on material collected by Lindheimer in Texas in 1849. The description was communicated to him by Engelmann from Lindheimer's manuscript. In the various herbaria are specimens no. 850 and 851 collected by Lindheimer in 1849 which have "Type Collection" written on the label and these should be considered the type.

The greater number of plants of this species have large flowers with normal exserted style and stamens, but there are a few with small flowers having short and apparently abortive stamens and still fewer with large flowers and short apparently abortive styles. All of these plants have an abundance of fruits which suggest that the style may be slow in growing. This condition is apparently to be found in other

species also, as in some plants the styles are short in the very young flowers while in the more mature flowers they exceed the stamens in length. Where the small flowers with the short apparently abortive stamens are concerned, however, another factor must be involved since the entire plant is more congested.

This species apparently has a much longer flowering period than any of the other species growing in the same region. The writer collected it in good flowering and fruiting condition during the latter part of May 1936 in and near the Edwards Plateau region. Other species normally growing in Texas were either completely out of fruit for the season or in the last fruiting stages.

7. *V. texana*, sp. nov., caule 1–3 dm. alto, gracili, in angulis pubescenti; foliis margine et pagina superiore pubescentibus, inferioribus spathulatis, superioribus oblongo-ovatis; bracteis lanceolatis ciliatis; inflorescentia laxa et corymbose cymosa; corolla alba infundibulariformi 2–2.5 mm. longa; tubo gracili limbum subaequante; faucibus sublatis basi non gibbosis; staminibus styloque exsertis; lobis stigmatibus brevibus; fructu stramineo a latere compresso pubescenti capillis brevibus capitatis in seriebus quattuor in longitudinem, seriebus duobus quorum pagina dorsali loculi fertilis, et serie una pagina ventrali loculorum sterilium singulorum dispositis; loculo fertili anguste oblongo apice mucronato quam latitudine fructus valde angustiore; valle inter loculos steriles angusta profunda in medio costata.

Stem 1–3 dm. high, rather frail, pubescent on the angles: leaves hairy on the margin and upper surface; the lower spatulate; the upper oblong-ovate, sessile: bracts lanceolate, ciliate: inflorescence loosely and corymbosely cymose: corolla white, funnel-form, 2–2.5 mm. long; tube slender, about as long as the limb; throat rather wide without a conspicuous gibbosity at its base; stamens and style exserted: stigma-lobes short: fruit yellowish, laterally compressed, with four lines of short capitate hairs, 2 down the dorsal side of the fertile cell and one down the ventral side of each sterile cell; fertile cell narrowly oblong, produced at apex into a prominent tooth, much narrower than the combined width of the sterile cells which have a narrow deep groove between them with a prominent nerve down the middle of the groove. —Moist stream-banks in the vicinity of Kini Creek. TEXAS: Kini Creek, Gillespie Co., *Gustav Jermey Herbarium*, no. 137 (TYPE in Herb. Missouri Bot. Gard.).

Although only four plants have been seen, the flowers and fruits seem distinct enough to warrant the treatment of this as a species. Indeed it does not appear to be closely related to any other species known to the writer either in North America or in Europe. Further

search should be made for it in south-central Texas. During the latter part of May 1936, the writer attempted to locate it in Texas. Since none of the available topographical maps of Gillespie County indicated the location of "Kini Creek," those in authority at the county court house were consulted. No one knew of a "Kini Creek" and there was no record of a creek by that name. It was suggested, however, that the creek running through a farm owned by a Mr. Kiehne might be the one intended. Accordingly the creek-banks were searched carefully but no trace of a *Valerianella* could be found. As the season was far advanced and the creek-banks were being fast inundated by frequent rains, the search was discontinued for the time, to be resumed another year earlier in the season.

8. *V. CARINATA* Loiseleur, Not. de Fl. de France, 149 (1810). *Fedia caniculata* Spenn., Fl. Freiburg, 478 (1826). *V. praecox* Willkomm, Pugill. pl. nov. penins. Pyren. Linnaea **30**: 104 (1859).—Stem 0.5–5 dm. high, rather frail, pubescent: leaves hairy on the margin and upper surface; the lower obovate-spatulate, entire; the upper oblong-ovate with few teeth near the base: bracts ciliate, apex blunt or rounded: inflorescence loosely corymbose-cymose: corolla white with purplish-blue limb, 1.5–2 mm. long; tube and throat together about as long as the limb; a saccate gibbosity at base of throat on ventral side: stamens and style slightly exserted: stigma-lobes short: fruits yellowish, oblong, 1.5–2 mm. long, finely pubescent; fertile cell smaller than the combined width of the sterile cells; margin of the sterile cells ventrally incurved forming a deep cavity with a prominent nerve down the middle; a conspicuous nerve down each sterile cell near the margin.—Moist damp rocky places in Oregon. Introduced from Europe. OREGON: in crevices of stone fence, Salem, April 1915, no. 43 and May 1917, no. 1152, *J. C. Nelson*; rocky cliffs along Willamette River, 2 miles south of Oregon City, May, 1918, *Nelson*, no. 2111.

The name *V. carinata* is the one generally accepted for this species in European floras.

This species, from Europe, is here included in the North American flora for the first time. *J. C. Nelson* collected it in Oregon in 1915, 1917 and again in 1918 but confused it with *V. Locusta*. It is very similar to this latter species but there is no corky mass on the dorsal side of the fertile cell, which is so prominent on the fruits of *V. Locusta*. The plant has also been collected in Venezuela, where it is reported as having been introduced.

9. *V. STENOCARPA* (Engelm.) Krok. *Fedia (Valerianella) stenocarpa* Engelm. Mss., Gray, Plant. Lindh. pt. 2, in Boston Jour. Nat.

Hist. 4: 216 (1857). *V. stenocarpa* Krok, Kongl. Svensk. Akad. Handl. 5: 64 (1864); Gray, Syn. Fl. N. Am. 1, pt. 2: 45; Britton & Brown, Ill. Fl. 3: 246 and ed. 2, 3: 287; Robinson & Fernald, Gray's Man. ed. 7, 763; Rydberg, Fl. Pr. Pl. Cent. N. Am. 760; Small, Fl. Se. U. S. ed. 1 and ed. 2, 1129.—Stem 1–5 dm. high, pubescent on the angles: leaves ciliate; the lower spatulate with their bases connate, entire; the upper usually ovate with a few teeth on each side near the base: bracts lanceolate, glabrous or rarely weakly glandularly fimbriate-serrulate toward the tip: inflorescence loose, corymbose-cymose: corolla white, 2–3 mm. long, funnel-form; tube short, less than one-half the length of the limb; a saccate gibbosity at the base of the throat on the ventral side: stamens and style exserted: stigma-lobes short: fruit yellowish, narrowly ellipsoid, more than twice as long as wide, glabrous or pubescent; fertile cell wider than the combined width of the sterile cells, rounded on the dorsal side, sometimes with a weak nerve down the middle; groove between the slender sterile cells narrow, rarely with a rather prominent nerve down the middle.—Rocky ledges and low moist grounds along rivers in central and eastern Texas. TEXAS: Austin, *Berlandier*, no. 334; Solado River, *Havard*, no. 21; Medina River, April 3, 1932, *Marcus E. Jones*, no. 29229; thickets in light soil, San Antonio, 1849, *Lindheimer*, no. 407; margin of thickets on wet prairies, New Braunfels, April, 1850, *Lindheimer*, no. 456; Comanche Spring, New Braunfels, etc., March 1851, *Lindheimer*, no. 852 (these all from type localities); rocky grounds along wooded bluffs of Guadalupe River, near Kerrville, May 7, 1928, *E. J. Palmer*, no. 33788; moist grounds along river, Kerrville, April 8, 1917, *E. J. Palmer*, no. 11500; below Bluffs, Guadalupe River, Kerrville, May 16, 1918, *E. J. Palmer*, no. 13624; on barren sterile land, Tarrant Co., May 17, 1921, *Ruth*, no. 52 (in part).

This species was based by Engelmann on material collected in Texas by Lindheimer in 1846 ("no. 407"). In the herbarium of the Missouri Botanical Garden is a specimen, which is doubtless to be considered the type. This is numbered 407 and the label, written by Lindheimer in German script, when translated reads as follows, "common on moist prairies and along swift stream banks, near New Braunfels and San Antonio." There are two other specimens collected by Lindheimer which bear the same number, "407," as the above. One is in the herbarium of the University of California. The other is in the Gray Herbarium. These are doubtless also specimens from the type collection.

The fruits of this species are narrowly ellipsoid and the corollas are 2–3 mm. long (usually 3 mm.) as opposed to the ovoid or nearly orbicular fruits, and corollas 1.5–2 mm. long (usually 1.5 mm.), of *V. radiata* and *V. Woodsiana*.

The writer searched for this species in Texas during the latter part of May, 1936 but failed to locate it. Specimens had been collected by others on May 16, 1918 and May 17, 1921, but apparently in 1936 the season was much farther advanced.

10. *V. STENOCARPA* (Engelm.) Krok, var. **parviflora**, var. nov., corolla alba infundibulariformi 1.5 mm. longa; ab forma typica fructu plus minusve minori recedit.

Corolla white, funnel-form, 1.5 mm. long: fruit slightly smaller than in the typical form of the species.—Light soils, barrens, and prairies of Missouri, Oklahoma, and Texas. MISSOURI: "common in barrens," Dodson, Jackson Co., June 10, 1896, *Bush*, no. 793; "common," Dodson, May 11, 1895, *Mackenzie*, no. 293. OKLAHOMA: "common," Sapulpa, April 28, 1895, *Bush*, no. 1272; vicinity of Ft. Sill, May 3, 1916, *Mr. & Mrs. Joseph Clemens*, no. 11789; growing with *V. radiata* along stream-bank near roadside north of Antlers, Pushmataha Co., May 18, 1936, *Sarah C. Dyal, Elizabeth Fisher & Helen Hazard*, no. 248 (TYPE in Herb. Cornell Univ.). Arbuckle Mts., April 1, 1916, *W. H. Emig*, no. 402; Muskogee Co., Sec. 22, T. 14 N., R. 18 E., April 23, 1927, *E. L. Little*, no. 1572. TEXAS: woods, Hempstead, April 24, 1872, *Elihu Hall*, no. 294; "common in woods," Dallas, April 14, 1900, *Bush*, no. 601; prairies north of Dallas, May 3, 1900, *Eggert*; light soil, Dallas, May 15, 1900, *Reverchon*, no. 2124.

This variety has a wider and more northern range than the typical form.

Because of the advanced season the writer was able to locate but a single specimen of this species during the latter part of May, 1936. Some of the seeds, however, were planted in the greenhouse at Cornell University and are at this writing in good flowering condition.

11. *V. Palmeri*, sp. nov., caule 1.5–5 dm. alto in angulis pubescenti; foliis ciliatis, inferioribus spathulatis connatis integris, superioribus plerumque ovatis non connatis ad basin paucidentatis; bracteis lanceolatis glabris; inflorescentia laxa corymbose cymosa; corolla alba infundibulariformi 3–4 mm. longa; tubo gracili limbo brevior; faucibus basi gibbosis; staminibus et stylo exsertis; lobis stigmatibus brevibus; fructu subflavo 2.5–4 mm. longo ovoideo a dorso compresso; loculo fertili uni-nervato vel enervato, quam loculis sterilibus subabortivis valde latiore; valle inter loculos steriles angustissima.

Stem 1.5–5 dm. high, pubescent on the angles: leaves ciliate; the lower spatulate, connate, entire; the upper usually ovate, not connate, with a few teeth on each side near the base: bracts lanceolate, glabrous: inflorescence loose, corymbosely cymose: corolla white, funnel-form, 3–4 mm. long; tube slender, shorter than the limb; a saccate gibbosity at the base of the throat on the ventral side: stamens and style exserted: stigma-lobes short: fruit yellowish, 2.5–4 mm. long, ovoid,

flattened dorsiventrally; fertile cell with or without a prominent nerve, much wider than the slender almost abortive sterile cells; groove between the sterile cells very narrow.—Rocky banks and open woods in ARKANSAS: Hot Springs, April, 1924, *Mrs. J. Connell* (in part); rocky ledges and open woods, Magnet Cove, Hot Springs Co., April 19, 1926, *E. J. Palmer*, no. 29726 (TYPE in Herb. Missouri Bot. Gard.); rocky open banks near Hot Springs, Garland Co., May 14, 1924, *E. J. Palmer*, no. 24898; rocky banks near Hot Springs, Garland Co., April 22, 1924, *E. J. Palmer*, no. 24476; Baker Springs, Howard Co., April 12, 1909, *John H. Kellogg*.

This species resembles *V. stenocarpa* in general aspect but the fruits are ovoid instead of ellipsoid. Also there is a difference in range, *V. Palmeri* being known only from Arkansas and *V. stenocarpa* from Texas. Unfortunately the writer was not able to locate this species during May 1936, because of the advanced season.

12. *V. intermedia*, sp. nov., caule 1.5–3 dm. alto in angulis pubescenti; foliis ciliatis, inferioribus spathulatis connatis integris, superioribus oblongo-ovatis non connatis ad basin paucidentatis; bracteis plerumque glabris lanceolatis, exterioribus in plantis junioribus ciliatis; inflorescentia laxa corymbosa cymosa; corolla alba vel subpunicea infundibulariformi 3–5 mm. longa; tubo gracili limbum subaequante; faucibus basi gibbosis; staminibus et stylo exsertis; lobis stigmatis brevibus; fructu subflavo 2–2.5 mm. longo ovoideo glabro vel pubescente; loculo fertili quam loculis sterilibus duobus valde latiore a dorso compresso in medio plerumque uni-nervato in marginibus subacuto; fructu inter loculos steriles anguste et non profunde canaliculato, utrinque inter loculum fertilem et loculos steriles valde uni-nervato.

Stem 1.5–3 dm. high, pubescent on the angles: leaves ciliate; the lower spatulate, connate, entire; the upper oblong-ovate, not connate, with a few coarse teeth near the base; bracts usually glabrous, lanceolate, the outer ones in young specimens ciliate: inflorescence loose, corymbosely cymose: corolla white or pinkish, funnel-form, 3–5 mm. long; tube slender, about as long as the limb; a saccate gibbosity at the base of the throat on the ventral side: stamens and style exserted: stigma lobes short: fruit yellowish, 2–2.5 mm. long, ovoid, glabrous or pubescent; fertile cell broader than the combined width of the sterile cells, flat on the dorsal side, usually with a prominent nerve down the center, edges rather acute; groove between the sterile cells narrow and shallow; a prominent nerve on each side of the fruit between the fertile and sterile cells.—Low moist grounds from Massachusetts and Connecticut to Illinois and southward to North Carolina and Kentucky. Specimens from North Carolina are without doubt cultivated. Among 50 specimens examined were the following: MASSACHUSETTS: Stockbridge, June, 1891, *Shear*; Springfield, near B. & A. railroad, July, 1892, *Maria L. Owen*. CONNECTICUT: marshy

field, Suffield, June 19, 1923, *J. F. Smith*, June, 1934, *J. F. Smith* and *F. H. Sargent*. NEW YORK: Mohawk flats near Utica, June 12, 1873, *Haberer*; alluvial meadows, Mohawk flats, Utica, June 17, 1872, *Haberer*, no. 404; in wet pasture north of Chenango River east of Greene, Chenango Co., June 18, 1924, *Muenschner*, *C. L. Wilson*, and *A. S. Foster*, no. 15976 (TYPE in Herb. Cornell University); Newark, Wayne Co., May 9, 1871, *Hankenson*. NEW JERSEY: near Red Bank, Gloucester Co., May 25, 1871, *C. F. Parker*, no. 2865. PENNSYLVANIA: Washington Co., *W. H. Brewer*; Little Conestoga, April, 1889, *J. H. Eby*; moist banks along Darby Creek, Coopertown road, Delaware Co., May 16, 1930, *Fogg*, no. 4098; meadow below Williams, York Co., June 3, 1895, *Glatfelter*; banks of Little Conestoga, Lancaster Co., May 18, 1889, *Heller*; bank of Tolpehocken Creek, South Bernville, Berks Co., May 15, 1932, *F. J. Hermann* and *H. N. Stoudt*, no. 2900; York Furnace, May 14, 1899, *MacElwee*, no. 227; Bucks Co., May 1865, *Moyer*, no. 2866; Stewart to Perrysville, Allegheny Co., May 31, 1901, *J. A. Shafer*, no. 320; bank of Schuylkill River, Tunnell Hill, Phoenixville, Chester Co., May 18, 1929, *H. E. Stone*. DISTRICT OF COLUMBIA: low thickets near Great Falls of the Potomac, rare, May 10, 1899, *Holm*. NORTH CAROLINA: Hyams Garden, Statesville, June 6, 1879, *Redfield*, no. 11736. OHIO: Columbus, 1842, *Sullivant*; June 23, 1891, *Werner*, no. 371; moist grounds, Mansfield, May 20, *E. Wilkinson*, no. 4382. INDIANA: in swamp along Raccoon Creek, 4 miles south of Russellville, May 18, 1911, *Grimes*, no. 487; flood-plain of creek, Ft. Harrison near Indianapolis, Marion Co., May, 1926, *William Rhoades*; Lick Creek, Ingalls, Madison Co., May 26, 1913, *H. H. Smith*, no. 3635. ILLINOIS: Deer Park Canyon, Lasalle Co., June 1-7, 1909, *Greenman*, *Lansing & Dixon*, no. 134; Forest of Arden, Ottawa, May 30, 1905, *Skeels*, no. 613 (in part). KENTUCKY: 1840, *Short*.

The name *intermedia* was chosen because of the apparently intermediate position of these plants between *V. chenopodifolia* and *V. radiata*.

The specimens forming the basis of this species were found scattered in the herbaria under various names. In large flower and shape of fruit they bear a great similarity to *V. chenopodifolia* but in foliage, pubescence and size of fruit they are more like *V. radiata*. They can also be readily distinguished from *V. radiata* and its varieties by the large (3-5 mm. long) corollas. As in several other species there are both glabrous- and pubescent-fruited forms. The glabrous fruits are more common in the northern part of the range. The pubescent form tends to be slightly smaller than the glabrous form.

The rosettes formed by the plants grown in the greenhouse at Cornell University from seeds collected near Oxford, Ohio and sent

to the writer by Dr. R. S. Snell tend to strongly support the contention that this new plant is a specific entity. The leaves are ovate, petiolate with the leaf-blade abruptly rounded to the petiole and only slightly decurrent on the latter. In the rosettes of the other species grown, *V. amarella*, *V. Bushii*, *V. chenopodifolia*, *V. longiflora*, *V. ozarkana*, *V. Nuttallii*, *V. radiata* and varieties, *V. stenocarpa* var. *parviflora*, and *V. Woodsiana*, the leaves are spatulate or strap-like with the blade gradually decurrent on the petiole. Outline drawings of the two types of rosettes are shown on PLATE 492 and will give the reader a clearer idea of these differences.

13. *V. RADIATA* (L.) Dufr. *Valeriana Locusta*, *ε. radiata* Linn., Sp. Pl. 34 (1753). *Fedia radiata* Michx., Fl. Bor. Am. 1: 118 (1803); T. & G., Fl. N. Am. 2: 52 (1841). *Valerianella radiata* Dufr., Hist. Val. 57 (1811); Krok, Kongl. Svensk. Akad. Handl. 5: 64 (1863); Gray, Syn. Fl. N. Am. 1, pt. 2: 45; Britton & Brown, Ill. Fl. 3: 246 and ed. 2, 3: 287; Robinson & Fernald, Gray's Man. ed. 7, 762; Small, Fl. Se. U. S. ed. 1 and 2, 1129; Small, Man. Se. Fl. 1278.—Stem 1.5–6 dm. high, rather stout and pubescent along the angles: leaves hairy on the margin and on the midrib on the lower surface; the lower oblong-spatulate, connate, entire; the upper oblong-ovate, often coarsely toothed at the base, not connate: bracts lanceolate; the outer slightly ciliate; the inner glabrous: inflorescence loose, corymbosely cymose: corolla white, funnel-form, 1.5–2 mm. long; tube shorter than the limb; a saccate gibbosity at the base of the throat on the ventral side: stamens and style exserted: stigma-lobes short: fruit yellowish, ovoid, 2 mm. long, glabrous or pubescent; fertile cell as broad as or broader than the combined width of the sterile cells; groove between the sterile cells narrow to rather wide and often rather deep; a slight groove on each side between the fertile and sterile cells.—Low moist grounds from Pennsylvania to Kansas, southward to Florida and Texas. Among 100 specimens examined were the following. MARYLAND: Chesapeake Beach, Calvert Co., May 20, 1905, *H. D. House*, no. 746. VIRGINIA: low ground, Gloucester Court House, May 15, 1930, *L. H. Bailey*; grassy banks, Hampton, May 23, 1912, *B. L. Robinson*. NORTH CAROLINA: in moist soil among rocks along the French Broad River, Biltmore, Buncombe Co., June 1, 1898, *Biltmore Herbarium*, no. 4755a; near Salisbury, April 28, 1897, *Biltmore Herbarium*, no. 4755 (in part); "Deep-Water," Hot Springs, Madison Co., June 3, 1899, *J. R. Churchill*; in low places, Salem Creek, *Schallert*. SOUTH CAROLINA: Clemson College, Oconee Co., April 16, 1906, *H. D. House*, no. 1850; roadside bank, in moist ground near Congaree Creek, Lexington Co., April 27, 1932, *C. A. Weatherby*, no. 6122 (not typical). OHIO: *Sullivant*. ILLINOIS: rocky hills, St. Clair Co., May 18, 1877, *Eggert*; along stream in mesophytic woods and on rock barrens, Makanda, June 11, 1904, *Gleason*; open damp ground, E. Alton,

Madison Co., June 1904, *F. E. McDonald*; Red Bud, June 3, 1888, *Pammel*. TENNESSEE: Kinsel Springs, Blount Co., May 5, 1929, *W. A. Anderson*, no. 1205; moist woods, Jackson, May 1893, *Samuel M. Bain*, no. 18; Lookout Mt., May 8, 1906, *J. R. Churchill*; fields, Nashville, May, *Gattinger*; waste and open grounds, Memphis, Shelby Co., April 24, 1920, *E. J. Palmer*, no. 17276; thickets, Knox Co., July 1898, *Albert Ruth*, no. 613. GEORGIA: fields, Chickamauga Park, May 25, 1911, *J. R. Churchill*; river road, Georgia State Coll. Agr. Farm, Clarke Co., May 10, 1929, *Miller & Maguire*, no. 1471; sandy base of Pine Mt. 1 mile north of Lithonia, April 28, 1934, *Lily M. Perry* and *M. C. Myers*, no. 1066. ALABAMA: abundant in grass, along roadside near Montgomery, April 22, 1934, *L. H. Bailey*, no. 41; LOUISIANA: vicinity of Covington, May 4, 1920, *Bro. G. Arsène*, no. 11996; near Madisonville, April 14, *Joor*. MISSOURI: low ground, near Concordia, April 26, 1927, *L. H. Bailey* and *Ethel Zoe Bailey*, no. 10277; bottoms, Pettis Co., May 29, 1934, *Bush*, no. 13646; damp creek-bank, Seligman, Barry Co., May 9, 1936, *Sarah C. Dyal*, *Elizabeth Fisher & Helen Hazard*, no. 227; damp roadside south of Seligman-Barry Co., May 9, 1936, *Dyal, Fisher & Hazard*, no. 228; damp roadside south of Holsum, Barry Co., May 9, 1936, *Dyal, Fisher & Hazard*, no. 229; damp stream-bank, Eagle Rock, Barry Co., May 9, 1936, *Dyal, Fisher & Hazard*, no. 230; moist creek-bank, Noel, McDonald Co., May 10, 1936, *Dyal, Fisher & Hazard*, no. 231; rocky open ground, Galena, Stone Co., May 21, 1914, *E. J. Palmer*, no. 5701; near Springfield, May 5, 1890, *Stewart Weller*; "common in open ground," Carthage, Jasper Co., May 12, 1909, *E. J. Palmer*, no. 1993; "common in woods," Eagle Rock, June 15, 1897, *Bush*, no. 181; "common in woods," Neosho, May 30, 1900, *Bush*, no. 426; wet places, Noel, May 10, 1915, *Bush*, no. 7515. ARKANSAS: "common in sandy soil," Varner, Lincoln Co., April 28, 1898, *Bush*, no. 57; "common in sandy soil," Moark, Clay Co., April 21, 1898, *Bush*, no. 22; prairies, Fulton, April 16, 1905, *Bush*, no. 2343; damp sandy roadside, Atkins, Pope Co., May 13, 1936, *Dyal, Fisher & Hazard*, no. 238; damp roadside between Waldron and Abbott on route 71, Scott Co., May 14, 1936, *Dyal, Fisher & Hazard*, no. 239; dry roadside, Hot Springs, Garland Co., May 14, 1936, *Dyal, Fisher & Hazard*, no. 240; roadside between Avoca and Rogers, Benton Co., May 10, 1936, *Dyal, Fisher & Hazard*, no. 232; damp roadside north of Fayetteville, Washington Co., May 11, 1936, *Dyal, Fisher & Hazard*, no. 233; along stream-bank near bridge over White Creek between Fayetteville and Huntsville, Washington Co., May 11, 1936, *Dyal, Fisher & Hazard*, no. 234; damp rocky roadside south of Marble Falls, Pope Co., May 12, 1936, *Dyal, Fisher & Hazard*, no. 235; sandy roadside north of Dover, Pope Co., May 12, 1936, *Dyal, Fisher & Hazard*, no. 236; sandy roadside, Le Petit Jean State Park, Garland Co., May 13, 1936, *Dyal, Fisher & Hazard*, no. 237; Baucum, Pulaski Co., April 16, 1933, *D. M. Moore*, no. 330065; open pasture, west of Viola, *Moore*, no. 300235; Fayette-

ville, Washington Co., May 22, 1936, *E. L. Neilsen*, no. 3703; river bank, Eden's Bluff, near Rogers, Benton Co., June 6, 1936, *Nielsen*, no. 3869; rocky open banks near Hot Springs, Garland Co., May 14, 1924, *E. J. Palmer*, no. 24898; cultivated land, Monte Ne, Benton Co., May 15, 1931, *Eunice Ruddick*, no. 762. KANSAS: Miami Co., June 1885, *Oyster*, no. 3382; low ground, Cherokee Co., 1896, *A. S. Hitchcock*, no. 710. OKLAHOMA: near Ochelata, April 23, 1927, *L. H. Bailey* and *Ethel Zoe Bailey*, no. 10226; damp lowland, one mile east of Norman, May 1, 1928, *Fred A. Barkley*, no. 260; "common," Sapulpa, May 2, 1895, *B. F. Bush*, no. 878; damp roadside south of Tuskahoma, Pushmataha Co., May 18, 1936, *Dyal, Fisher & Hazard*, no. 241; damp roadside north of Antlers, Pushmataha Co., May 18, 1936, *Dyal, Fisher & Hazard*, no. 242; roadside between Poteau and Wister, Le Flore Co., May 19, 1936, *Dyal, Fisher & Hazard*, no. 243; dry roadside west of Hugo, Choctaw Co., May 19, 1936, *Dyal, Fisher & Hazard*, no. 245; damp sandy roadside near Finley, Choctaw Co., May 19, 1936, *Dyal, Fisher & Hazard*, no. 246; Muskogee Co., Sec. 14, T. 13 N., R. 17 E., Lot no. 7, April 15, 1927, *Elbert L. Little*, no. 1570; valley of Little River west of Ludlow, Le Flore Co., June 8, 1930, *Elbert L. Little*, and *Charles E. Olmsted*, no. 175; granite hills south of Mill Creek, May 12, 1930, *Paul B. Sears*, no. 1319. TEXAS: Ottine Swamp, Gonzales Co., April 30, 1933, *Cory*, no. 5807; dry roadside north of Dallas, Dallas Co., May 19, 1936, *Dyal, Fisher & Hazard*, no. 244; dry bed of Bull Creek west of Austin, Travis Co., May 21, 1936, *Dyal, Fisher & Hazard*, no. 247; low open woods, Ganado, Jackson Co., March 20, 1916, *E. J. Palmer*, no. 9230; "common in woods," May 2, 1901, *Reverchon*, no. 2604; Victoria, April 26, 1906, *Tracy*, no. 9261; moist woods, Austin, May 1, 1918, *M. S. Young*, no. 133.

The name was based by Linnaeus primarily on the Gronovian reference which in turn was based on Clayton's specimen no. 43. This specimen, in the British Museum, has been seen by the writer. It is labeled *Valeriana Locusta* var. *radiata*.

The fruits are more variable than those of any other species studied. Torrey and Gray proposed the name var. *leiocarpa* for the glabrous-fruited form. In almost every species glabrous- and hairy-fruited individuals occur and it has scarcely seemed wise to distinguish these by formal names.

During May 1936, this species was found to be very common in the Ozark region south to Hot Springs, west into eastern Oklahoma and south to San Antonio, Texas. In southwestern Missouri the roadsides and whole fields were white with it.

14. *V. RADIATA* (L.) Dufr., var. **missouriensis**, var. nov., loculis sterilibus divergentioribus in tota latitudine loculum fertilem plus minusve excedentibus.

Sterile cells of fruit more widely divergent, making their combined width somewhat greater than the fertile cell.—Low moist or light soils in Missouri and northern Arkansas. MISSOURI: common on prairies, Webb City, May 12, 1902, *Bush*, no. 1616; gravel banks, Oak Grove, June 2, 1913, *Bush*, no. 7019; bottoms, Morgan Co., May 29, 1935, *Bush*, no. 14789 (TYPE in herb. Cornell Univ.); sandy soil, Silex, May 29, 1915, *John Davis*, no. 4418; meadows, Forestell, St. Charles Co., May 25, 1917, *Davis*, nos. 7358 and 7629; Pacific, June 1, 1892, *Dewart*; moist sandy bank south of railroad station, Allenton, St. Louis Co., May 6, 1936, *Sarah C. Dyal, Elizabeth Fisher & Helen Hazard*, no. 226; St. Louis, May 18, 1877, *Eggert*; near Arcadia, Iron Co., May 1925, *Greenman*, no. 4779; Allenton, July 1890, *Letterman*; rare and local, barrens, Kansas City, May 17, 1896, *Mackenzie*, no. 229; low ground, Dulle Mill, in Callaway Co., east of Ashland, May 10, 1930, *Rickett*; and in alluvial soil, near Gravis Road, St. Louis Co., May 17, 1906, *James I. Shannon*, no. 245. ARKANSAS: woods, Moark, May 2, 1905, *Bush*, no. 2588.

This variety differs from the typical form only in the more widely diverging sterile cells and the slightly larger fruits.

15. *V. RADIATA* (L.) Dufr., var. **Fernaldii**, var. nov., a forma typica recedit corolla aliquantum majore; fructu elongatiore plerumque pubescenti; loculo fertili dorso rotundato totam latitudinem loculorum steriliū angustorum valde superante; valle inter loculos steriles tenui vel deficienti.

Corolla slightly larger than in the typical form: fruit more elongate, usually pubescent, fertile cell rounded on the dorsal side, much wider than the combined width of the slender sterile cells; groove between sterile cells slight or wanting.—Low moist places from Connecticut and Pennsylvania, south to North Carolina and westward to Missouri and Texas. CONNECTICUT: slope of terrace, east shore of Niantic River, Waterford, June 12, 1902, *Graves*. PENNSYLVANIA: Huntingdon Co., 1847, *Porter*. VIRGINIA: cultivated field, 1 mile north of Williamsburg, April 30, 1921, *Grimes*, no. 3504; low grounds near stream, 1 mile south of Williamsburg, May 8, 1921, *Grimes*, no. 3545; wooded flood-plains, 3 miles north of Williamsburg, Queens Creek, May 23, 1921, *Grimes*, no. 3617; in clay at roadside east of Little Creek, May 4, 1935, *Fernald & Griscom*, no. 4509 (TYPE in Gray Herb.); sandy roadside west of Pungo, May 6, 1935, *Fernald & Griscom*, no. 4510; border of woods, Land of Promise, May, 1935, *Fernald & Griscom*, no. 4511; grassy banks, Hampton, May 23, 1912, *B. L. Robinson*, no. 412. NORTH CAROLINA: in moist soil among rocks along the French Broad River, Biltmore, Buncombe Co., June 1, 1898, *Biltmore Herbarium*, no. 4755a (in part). MISSOURI: *Greenman*, no. 4068. TEXAS: Sefkey Swamp, Gonzales Co., April 30, 1933, *Cory*, no. 5808; Lufkin, Angelina Co., April 13, 1934, *Cory*, no. 8046.

This variety is named for Dr. M. L. Fernald who first brought it to the attention of the writer in 1935.

16. *V. NUTTALLII* (T. & G.) Walp. *Fedia Nuttallii* T. & G. Fl. N. Am. **2**: 51 (1841). *V. Nuttallii* Walp., Rep. **2**: 527 (1843); Krok, Kongl. Svensk. Akad. Handl. **5**: 97 (1864); Gray, Syn. Fl. N. Am. **1**, pt. 2: 46 (1884). *Siphonella Nuttallii*, J. K. Small, Fl. Se. U. S. ed. 1 and 2, 1129 (1903 & 1913).—Stems 1–3 dm. high, sometimes pubescent on the angles: leaves pubescent on the margin; the lower obovate-spatulate, connate; the upper oblong-ovate, not connate: bracts ovate-lanceolate, strongly glandularly fimbriate-serrulate: inflorescence loose or congested, corymbosely cymose: corolla salver-form, 6–7 mm. long, the ventral lobe slightly longer; limb white; tube pink or white, slender, 4–5 mm. long, twice the length of the limb, with a callous gibbosity near the middle or above, on the ventral side: stamens and style long-exserted: stigma three-lobed, sometimes very conspicuous: fruit yellowish brown, nearly orbicular in ventral view, 2–3 mm. long, glabrous or finely pubescent; fertile cell elongate, much narrower than the large, inflated, divergent sterile cells; outer margin of each sterile cell bearing a strong nerve.—Low moist non-calcareous grounds in Western Arkansas and Eastern Oklahoma. ARKANSAS: light shaly soil in open meadow north of Alma, Crawford Co., May 5, 1935, *D. M. Moore*, no. 350031; “common in woods,” Prescott, May 14, 1900, *B. F. Bush*, no. 262; damp roadside on route 71 south of Winslow, Washington Co., May 14, 1936, *Sarah C. Dyal*, *Elizabeth Fisher & Helen Hazard*, no. 224; damp roadside and in the woods along a stream-bank on route 71 south of Abbott, Scott Co., May 14, 1936, *Dyal, Fisher & Hazard*, no. 224; roadside, Mulberry River near Cass, Franklin Co., May 27, 1936, *E. L. Nielsen*, nos. 3725 and 3726. OKLAHOMA: wet places 5 miles north of Limestone Gap, May 23, 1877, *Geo. D. Butler*, no. 11109; Limestone Gap, May 19, 1877, *Butler*, no. 101; Limestone Gap, 1875, *Butler*; Muskogee Co., Sec. 27, T. 13 N., R. 17 E., Lot no. 6, April 15, 1927, *E. L. Little, Jr.*, no. 1753; Muskogee Co., Sec. 24, T. 12 N., R. 19 E. about 2 miles east of Warner, May 15, 1927, *Little*, no. 1575.

This species was based by Torrey and Gray on material collected on the plains of Arkansas by Nuttall. A specimen in the herbarium of the New York Botanical Garden collected by Nuttall and labeled *Fedia Nuttallii* is doubtless to be considered the type.

V. Nuttallii differs from *V. longiflora*, *V. Bushii*, and *V. ozarkana* in having a shorter corolla-tube with the gibbosity near the middle or above instead of near the base, in the relatively larger limb, and in the more ovate bracts.

This species was rather common along the roadsides in northwestern Arkansas in May 1936. It was not found growing with *V. longiflora* at any time even though that species grew near.

17. *V. ozarkana*, sp. nov., caulibus 1.5–3 dm. altis in angulis

pubescentibus; foliis margine et pagina superiore ad apicem pubescentibus, inferioribus obovato-spathulatis connatis, superioribus oblongo-ovatis non connatis; bracteis anguste lanceolatis glandulose fimbriato-serrulatis; inflorescentia laxa corymbose cymosa; corolla hypocrateriformi 10–12 mm. longa, lobo ventrali aliquantum longissimo; limbo albo; tubo rufescenti gracili limbum 3–4-plo excedenti ad basin gibboso; staminibus et stylo valde exsertis; lobis stigmatis longis; fructu flavido-fusco 3 mm. longo a latere compresso in seriebus tribus in longitudinem pubescenti, serie una in costa pagina dorsali loculi fertilis et serie una loculis sterilibus singulis; tota latitudine loculorum sterilium loculum fertilem excedenti; valle inter loculos steriles angusta et profunda.

Stems 1.5–3 dm. high, pubescent on the angles: leaves hairy on the margin and on the upper surface toward the tip; the lower obovate-spatulate, connate; the upper oblong-ovate, not connate: bracts narrowly lanceolate, tip acuminate, glandularly fimbriate-serrulate: inflorescence loose, corymbosely cymose: corolla salver-form, 10–12 mm. long, ventral lobe slightly longer than the others; limb white; tube reddish, slender, 3–4 times the length of the limb, with a callous gibbosity near the base on the ventral side: stamens and style long-exserted: stigma-lobes long: fruit yellowish brown, 3 mm. long, laterally compressed with three lines of long whitish hairs, one down the keel-like projection on the dorsal side of the fertile cell and one down each sterile cell; the combined width of the sterile cells greater than the fertile cell; groove between the slightly divergent sterile cells narrow and deep.—Moist rocky calcareous grounds, southwestern Missouri and northwestern Arkansas. MISSOURI: barrens, Eagle Rock, April, 1898, *Bush*, no. 232 (in part); barrens, Noel, May, 1915, *Bush*, no. 7524; rocky cedar woods near stream, Eagle Rock, Barry Co., May 9, 1936, *Sarah C. Dyal, Elizabeth Fisher & Helen Hazard*, no. 225 (TYPE in herb. Cornell Univ.); rocky open woods near Seligman, Barry Co., May, 1926, *E. J. Palmer*, no. 29780. ARKANSAS: rich shelves of cliffs and rocky grounds, April, *Harvey*, no. 13421.

Name from the Ozark Mountain where these plants grow.

The laterally compressed fruits of this species can easily be distinguished from the dorsiventrally compressed fruits of the other species of the *Siphonella* group. Also the hairs on the fruits are rather long and arranged in three distinct lines while those on the fruits of the other species, when present, have no definite arrangement.

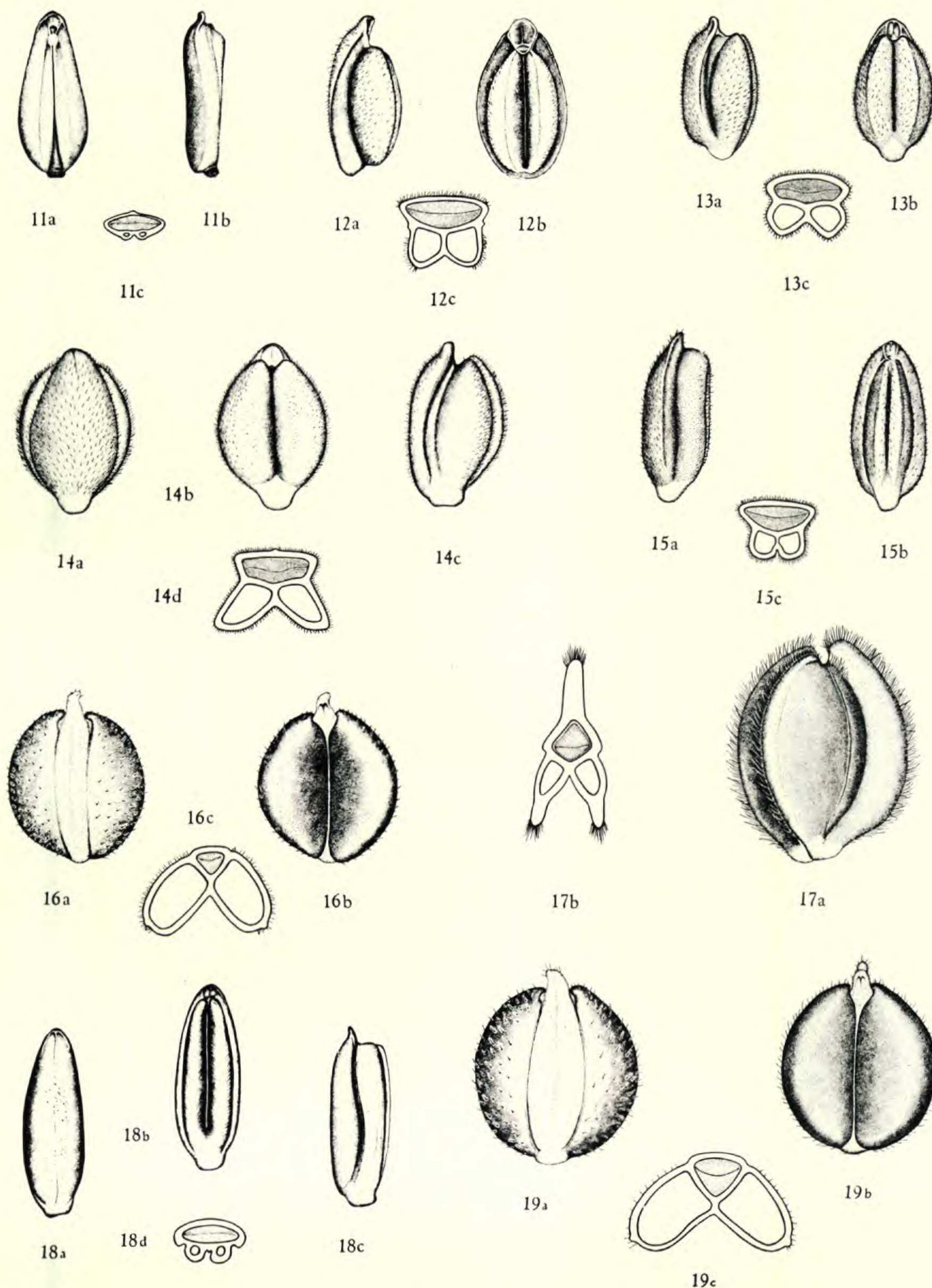
This species and *V. Bushii* have the same range and are found growing in the same colonies but since their fruits are so very distinct and since they have also been collected in separate colonies the writer feels that they should be considered as different species for the present at least. Seeds of these species were planted in the greenhouse at Cornell University and the fruits produced by these individuals

were like the ones planted. Apparently, therefore, the plant comes true to seed.

18. *V. Bushii*, sp. nov., caule 1.5–6 dm. alto in angulis pubescenti; foliis margine et pagina superiore ad apicem pubescentibus, inferioribus spatulatis plus minusve connatis, superioribus oblongo-ovatis sessilibus non connatis; bracteis anguste lanceolatis glandulose fimbriato-serrulatis acuminatis; inflorescentia laxa corymbose cymosa; corolla 10–12 mm. longa hypocrateriformi, lobo ventrali aliquantum longissimo; limbo albo; tubo rufescenti gracili limbum 3–4-plo excedenti, supra basin (2 mm.) gibboso; staminibus et stylo exsertis; lobis stigmatis longis; fructu flavido-fusco oblongo glabro vel pubescenti; loculo fertili totam latitudinem loculorum sterilium excedenti; loculis sterilibus non divergentibus; valle inter loculos steriles angusta tenui plerumque uni-nervata.

Stem 1.5–6 dm. high, pubescent on the angles: leaves hairy on the margin and on the upper surface toward the tip; the lower spatulate, somewhat connate; the upper oblong-ovate, sessile, not connate: bracts narrowly lanceolate, glandularly fimbriate-serrulate, acuminate: inflorescence loose, corymbosely cymose: corolla 10–12 mm. long, salver-form, ventral lobe slightly longer than the others; limb white; tube reddish, slender, 3–4 times the length of the limb, a callous gibbosity usually 2 mm. from the base in mature flowers: stamens and style long exserted: stigma-lobes long: fruit yellowish brown to brownish, oblong, glabrous or finely pubescent; fertile cell wider than the combined width of the sterile cells, the latter not divergent; groove between the sterile cells narrow and shallow and usually with a prominent nerve down the middle.—Moist rocky calcareous grounds in southwestern Missouri and northwestern Arkansas. MISSOURI: gravelly hills, Noel, April 25, 1909, *Bush*, no. 5520 and no. 5520a; gravelly woods, Noel, April 24, 1909, *Bush*, no. 5505; rocky cedar woods near stream, Eagle Rock, Barry Co., May 9, 1936, *Sarah C. Dyal, Elizabeth Fisher & Helen Hazard*, no. 218 (TYPE, in herb. Cornell Univ.); rocky woods, Galena, Stone Co., May 20, 1914, *E. J. Palmer*, no. 5664; open rocky hillside, Noel, May 1, 1914, *E. J. Palmer*, no. 5437; rocky woods near Galena, May 23, 1923, *E. J. Palmer*, no. 22803. ARKANSAS: north of Huntsville, Madison Co., April 30, 1923, *Buchholz*; at Withrow Spring, Madison Co., April 29, 1923, *Buchholz*; rocky hills in N. W. Arkansas, June, 1835, *Engelmann*, no. 672 (in part); on flat rock, Fayetteville, Washington Co., 1880, *Harvey*; east of Rogers, Benton Co., May, 1933, *D. M. Moore*, no. 330035; wet brushy banks, Eureka Springs, April 24, 1928, *Aven Nelson*, no. 10872; moist rocky open ledges along bluffs of White River, near Calico Rock, Izard Co., April 27, 1927, *E. J. Palmer*, no. 35576; rich shelves of cliffs and rocky low grounds, N. W. Arkansas, April, *Harvey*.

Name for the late Benjamin Franklin Bush of Courtney, Missouri, who collected many of the specimens cited. The earliest specimen is

FRUITS OF VALERIANELLA, $\times 12$

V. PALMERI: FIG. 11a, ventral view; 11b, lateral view; 11c, cross section. V. INTERMEDIA: FIG. 12a, lateral view; 12b, ventral view; 12c, cross section. V. RADIATA: FIG. 13a, lateral view; 13b, ventral view; 13c, cross section. V. RADIATA, var. MISSOURIENSIS: FIG. 14a, dorsal view; 14b, ventral view; 14c, lateral view; 14d, cross section. V. RADIATA, var. FERNALDII: FIG. 15a, lateral view; 15b, ventral view; 15c, cross section. V. NUTTALLII: 16a, dorsal view; 16b, ventral view; 16c, cross section. V. OZARKANA: 17a, lateral view; 17b, cross section. V. BUSHII: FIG. 18a, dorsal view; 18b, ventral view; 18c, lateral view; 18d, cross section. V. LONGIFLORA: FIG. 19a, dorsal view; 19b, ventral view; 19c, cross section.